Beets

ATLANTIC PROVINCES VEGETABLE CROPS GUIDE TO PEST MANAGEMENT 2002 - 2003

Distributed By:
FARM EXTENSION SERVICES
P.E.I. DEPARTMENT OF AGRICULTURE AND FORESTRY

Prince Edward Island
CANADA
Agriculture and Forestry
Farm Extension Services

Publication No. 1400A
Agdex No. 250/600
Published January 2002

Table of contents:

Introduction
Crop Establishment
Crop Management
Nutrition
Pests and Pest Control
Harvesting and Handling
Storage and Conditioning
Bibliography
Weeds
Insects
Diseases
Print as PDF

Home Page

Introduction

Beets are a member of the Chenopodiaceae (Goosefoot family). *Beta vulgaris* also includes within the species sugar beets, swiss chard and mangel-wurzel and the common weed lambsquarters. It is thought to have developed from *B. maritima* the seabeet which is native to Southern Europe. Red beets are annuals as cultivated or biennials if roots are grown for seed. It was not cultivated until the 3rd century AD and not developed until the 19th century by German and French breeders.

Beets are a cool season crop. The best quality and root color are obtained when the air temperature ranges between 10°C and 18°C. Abundant rainfall, nitrogen fertilizer and high temperatures provide for rapid development which leads to white rings in the interior of the beet root. The minimum soil temperature for beet germination is 5°C, with an optimum range of 10° to 30°C, an optimum temperature of 30°C and a maximum temperature of 35°C. Beets require a cold period of 2 weeks at 4° to 10°C or longer to initiate flowers (bolting). This may happen when beets are planted early and we have a cold May and June. Beets will tolerate frosts and mild freezes.

Beets prefer deep, friable, well drained, sandy loams to silt loams. Coarse sands need to be irrigated. High organic matter in the soil is desirable and will help ensure an adequate moisture supply. The beet has a fairly large root system extending

downward in the soil 1 m or more unless restricted.

Beets are used for bunched greens, bunched roots, beet roots and by processors for many products. Beets may be directly sown or transplanted into tunnel houses for early greens or bunching beets. In the field the first plantings are in late April or early May for early greens or bunching beets. For processing, beets can be planted from early May to late June. Beet roots for processing and fresh markets are harvested mainly in September and October. A yield of 20,000 kg per hectare is possible.

The main markets for beet greens and bunched beets are roadside, farmers markets and deliveries to wholesalers. The market for beet root is not a large market but it is significant. With storage the marketing season may be extended for roots. Processing beets are not currently being produced but there may be future potential. Beets then are marketed fresh from May until February (greens, then bunched roots, then roots and then stored roots).

Beets are marketed in the U.K. freshly cooked and in vacuum packs.

Nutrient Content: Has two edible parts - roots and leaves. The root contains potassium and folate as well as some Vitamin C. A 250 mL (1 cup) serving provides 58 kilocalories. Beet greens are a very good source of Vitamin A & potassium. They also contain some Vitamin C, calcium, and folate. 250 mL (1 cup) contains 26 kilocalories. Beet leaves make good salad greens.

Crop Establishment ▲ to Top

Seed Treatment - Beet "seed" is normally sold as a rough seed cluster containing one to three seeds. A number of types of monogerm seeds are available. In one type the cluster is ground, in the other type the polished seed is extracted, and in another type genetically monogerm seed is produced.

Seeding/Planting - Sow seed every 2 to 3 weeks to provide a continuous supply of bunched beet root. Beets reach market size in 6 to 8 weeks. Processing beets are harvested when the bulk of the roots are 5 to 8 cm in diameter usually 90 to 110 days after planting. Crops for storage should be sown about 10 weeks before harvest. Sow at a depth of 1 to 2.5 cm. Seed from 6 to 11 kg per hectare in rows 40 to 75 cm apart for market crops. Seed 15 kg per hectare for processing crops to give 50 to 80 plants per meter of row.

Multiple rows or beds may be used to advantage with wider spacings for equipment. Thinning may be necessary if too many seeds germinate and the market is for early beets (for roots or bunching).

For early beets in tunnel houses or in the field, sow seed in the greenhouse 6 weeks before transplanting in late April or early May. Use monogerm seed so that 6 seeds are seeded in each module or peat block. In the field, space plants 10 cm apart in rows 30 to 40 cm apart. Do not break the tap root when transplanting or deformed roots will result.

Some cultivars have larger leaves and therefore make better greens and bunched beets.

Crop Management ▲ to Top

Since herbicides do not usually give complete control, shallow cultivation may be necessary through the growing season as well as some hand weeding.

Irrigation may be applied to a field before planting to bring up the soil moisture level on sandy soils. Early beet root will benefit from irrigation prior to pulling. This aids in harvesting if the soil is dry.

Nutrition ▲ to Top

ALL ADDITIONS OF LIME AND FERTILIZER OR MANURES SHOULD BE BASED ON RECOMMENDATIONS FROM A SOIL TEST.

Manure - Well rotted manure may be used at 30 to 50 tons per hectare. Fresh manure with wood shavings or sawdust should not be used as this may aggravate scab.

Lime - Maintain a pH of 6.2 to 6.8 in all parts of the field (on mineral soils). Over liming may induce minor element deficiencies and encourage scab.

Nitrogen - Moderate amounts of nitrogen are recommended at the time of planting (not to exceed 100 kg per hectare actual). Sidedressings may be applied once or twice during the early part of the growing season (4 and/or 6 weeks after planting). Excessive nitrogen may mean excessive top growth and white ringing in the beet root if weather conditions are favorable.

Phosphorus - Moderate levels of phosphorus are recommended in balance with nitrogen levels. Band a high percentage of phosphorus if possible.

Potash - It may be useful to plow down at least 50% of the potash. If the potash level of the soil is low some potash should be plowed down.

Micronutrients - *Sodium* (NaC1) has been recom-mended in many growing areas. It is most effective at increasing yields where potash levels are low on sandy soils. It would be best applied broadcast and plowed down before planting. Apply 275 to 500 kg of salt (NaCl) per hectare. If potash levels are high do not apply.

Boron - Severe problems may result from a boron deficiency. When the soil pH is above 6, boron is not readily available for plant growth. Apply 3 to 5 kg of boron per hectare (15 to 25 kg Solubor) over the row at planting when both crop nutrition and weed control are desired. Use the lower rate of boron where it has been used often on that field. Stunting may occur on soils with a pH below 6 and organic matters below 3%. Foliar sprays may also be considered as alternatives especially when the initial soil boron level is quite high. (Solubor at the rate of 5.5 kg per hectare applied in 225 to 560 litres of water per hectare. A wetting agent should be added to the foliar spray.)

Manganese - Deficiencies of this nutrient may occur on soils with a high pH. A foliar spray of 3.5 kg of manganese sulphate in 1000 litres of water per hectare should be applied as soon as plants are large enough to absorb the solution. In the case of severe deficiency additional sprays may be necessary.

Application Method - Band phosphorus if possible. Broadcast and plow down potash and salt applications. Part of the nitrogen may be sidedressed.

Pests and Pest Control ▲ to Top

Weeds

Perennial weeds should be eliminated prior to planting beets. Herbicides recommended for use on beets are sometimes not readily available at planting and therefore herbicide orders should be placed early. Care must be taken to avoid fields where residual herbicides from previous years persist in the soil as crop injury may occur (eg. Treflan, Sencor, Atrazine).

Diseases

Damping-Off (fungi)

Characteristics: Beets are very susceptible to damping-off. Fungi attack seedlings at soil level causing them to topple over, or attack seeds following planting which causes seed decay and poor stands.

Control: The importance of damping-off control in beets is often overlooked. Seed can be treated with the appropriate fungicide before planting. Rotate with other crops, avoid wet soils and delay planting until the soil is warm.

Leaf Spot (fungus)

Characteristics: *Cercospora* leaf spot is characterized by spots that are brown to gray with distinct reddish-purple borders. The fungus overwinters in diseased crop residue or on seed and is spread by splashing water, insects, tools and implements, workers and wind. High humidity and moderate temperatures promote disease development.

Control: Follow a 2-3 year rotation. Apply a fungicide at first symptoms of disease and continue as necessary. Plow down crop debris promptly after harvest.

Scab (bacteria)

Characteristics: This same bacterium causes potato scab. This disease produces corky spots on the surface of beet roots. pH levels above 5.5 help promote disease development along with dry weather and coarse organic matter in the soil.

Control: The bacteria can exist in the soil for many years. Avoid land known to be infested or droughty, land and fields where sawdust, wood shavings or ashes have been applied. Avoid rotations with potatoes, if possible.

Phoma Heart Rot (fungus)

Characteristics: May cause seedling damping off, a distinct brown leaf spot which may lead to extensive foliage loss and a root decay.

Control: Follow a 2 to 3 year rotation. Avoid cold, wet soils. It is extremely important to ensure that the crop is well supplied with boron and sodium. Low levels of boron and sodium predispose the plants to attack by the fungus.

Black Spot (Boron Deficiency)

Characteristics: Causes scattered black lesions in flesh of root, sometimes with large black areas on root surface. Most prevalent in alkaline soils, high in calcium and is promoted by dry conditions.

Control: Apply boron with the fertilizer at planting.

Insects

Springtails

Characteristics: Springtails are minute, less than 4 mm long, and may occur in enormous numbers on the surface of and in soil high in decaying vegetable matter and other damp places. They are often dark in color. They may cause severe damage to seedlings. The plant may regrow in an abnormal, puckered form.

Control: Leaf miner sprays will control them when applied at first signs of injury.

Leaf Miner

Characteristics: These insects can cause serious losses in beets to be used for greens. White eggs are laid in groups of 1 to 5 on the underside of the leaves. After hatching, the tiny larvae eats a slender, winding trail inside the leaf. The mine becomes wider as the maggot grows and may join other mines in the leaf. The maggot stage lasts 2 to 3 weeks. In 2 to 4 weeks following pupation, adults (flies) will begin the next generation.

Control: Insecticides should be applied when mining damage is first observed. Two or three treatments at 10-day intervals may be needed. Early in the season, infestations may be suppressed by destroying infested crop residues and weeds.

SEE ATLANTIC PROVINCES "GUIDE TO PEST MANAGEMENT" FOR VEGETABLE CROPS.

Harvesting and Handling ▲ to Top

Harvesters used for other root crops are used for beets. Harvest under dry weather and soil conditions. Ensure that soil and debris are minimized in the bulk bins so that the beets have sufficient fresh air in storage.

Storage and Conditioning

Bunched beets can be held 10 days to 2 weeks at 0°C and a relative humidity above 95%. Late beets (topped) will keep 3 to 5 months under these conditions. If the humidity is not maintained at a high enough level, wilting will occur particularly in small beets.

Bibliography ▲ to Top

(See also General References)

Beetroot. 1983. Booklet 2444 prepared by the Ministry of Agriculture, Fisheries and Food. Alnwick, U.K. 40pp.

Compendium of Beet Diseases and Insects. 1986. American Phytopathological Society. St. Paul, Minnesota. 76 pp.

Boswell, V.R. 1967. Growing Table Beets. USDA Leaflet 360

Diseases and Pests of Vegetable Crops in Canada. 1994. The Canadian Phytopathological and Entomological Society of Canada. pp 50 to 60 and pp 407 to 409.

Prepared by: Horticulture Section, Production Technology Branch, Nova Scotia Department of Agriculture & Marketing on behalf of APASCC and members:

PEST	PESTICIDE (Formulation)	RATE Product	DAYS TO HARVEST	REMARKS ▲ to Top
Weeds ▲ to Top				
Preplant Perennial Weeds including quackgrass	ROUNDUP 356 Sn	2.5 to 7.0 L/ha	-	Apply in the fall or spring prior to planting. Annual weed control programs will be necessary to control weeds germinating after planting. For quackgrass control apply to actively growing quackgrass when at least 4 new leaves are present. The low rate (2.5 L/ha) will provide a minimum of one season control, while higher rates (4.75 to 7 L/ha) will provide longer term control. The low rate of Roundup should be applied in 50 to 100 L/ha water. If higher water volumes are used add a suitable surfactant. Wait 72 hours before plowing under. Best control of quackgrass is obtained when these herbicides are applied in the fall.
	TOUCHDOWN 480	2.5 to 7.0 L/ha	-	
	GLYFOS	2.5 to 7.0 L/ha	-	
	ROUNDUP TRANSORB	2.5 to 7.0 L/ha	-	
Preplant Incorporated Treatments Germinating grasses	RO-NEET 720 EC	4.75 to 6.25 L/ha	45	Use on mineral soils only. Both herbicides should be applied to a dry, clod-free soil and incorporated immediately. Use lower rates on sandy soils. Not effective on highly organic soils. Apply in 200 to 400 L of water/ha.
Preemergence Treatments	NATA SODIUM TCA	11 to 17 L/ha	-	Use only on mineral soils. Do not feed tops to livestock.

Germinating Grasses				
Germinating broadleaved weeds	PYRAMIN FL 430 Su	8.2 to 10.25 L/ha	-	Use only on mineral soils. Can be tank mixed with 5.50 to 6.75 kg/ha TCA for control of both broadleaf weeds and grasses.
Stale Seedbed Technique	GRAMOXONE 200 Sn	2.75 to 5.5 L/ha	-	Apply in 300 to 1100 L of water/ha to foliage of the emerged weeds but before the crop has emerged. Use Gramoxone for best control of grasses.
	REGLONE 200 Sn	2.75 to 5.5 L/ha	-	
	GRAMOXONE PDQ L	2 to 4 L/ha	-	Apply Gramoxone PDQ in 100 L of water/ha on a dark, cloudy day for best results.
Postemergence Treatments Annual broadleaf weeds	PYRAMIN FL 430 Su	8.2 L/ha	-	Apply after the first true leaf of beets is 2.5 cm long and before weeds have reached the 4th true leaf stage. Apply with 1/3 to 1/2 L Cittowett Plus.
	SPIN-AID 150 EC	5.0 to 6.6 L/ha	70	Use up to 28 L of water per L of Spin-Aid. Crop injury may occur under hot or rapidly changing climate conditions. Beets past the 3 true leaf stage are safely treated.
Inter-row shielded	GRAMOXONE 200 Sn	2.75 to 5.5 L/ha	-	Do not spray solution on the crop plant since it could be injured or killed. Use Gramoxone for best control of grasses.
	REGLONE 200 Sn	2.75 to 5.5 L/ha	-	
	GRAMOXONE PDQ L	2 to 4 L/ha	-	Apply Gramoxone PDQ in 200 to 500 L of water/ha on a dark, cloudy day for best results.

Insects

▲ to Top

Leaf miner	DIAZINON 500 EC	1.1 L/ha	14	
	DIAZINON 50 WP	1.1 kg/ha	14	
	MALATHION 500 EC	1.75 L/ha	7	
	MALATHION 25 WP	4.5 kg/ha	7	
	DZN 600EW	915 mL/ha	14	

Diseases

▲ to Top

Cercospora leaf spot	FIXED COPPER	Manufacturer's directions	1	Usually appears late in the season. Spray at 7 to 14 day intervals. Follow a 2 to 3 year rotation.